of the seeds of *Pistia* (Ueber *Pistia*, Berl. 1853, plate 1. f. C.D.E), where the many secondary rootlets, or branches of the neorhiza, force their way through the epirhizal covering of the main root, extending it as a coleorhiza, in the form of a long cylindrical tube, which at length breaks away, leaving a long sheath in the form of a thimble, covering the extremity of each growing rootlet, and which probably thus performs the functions of a spongiole.

BOTANICAL SOCIETY OF EDINBURGH.

Thursday, 12th July 1855.—Professor Balfour, President, in the Chair.

The following papers were read, viz.—

1. "On the Introduction of the Cinchona Tree into India." By Thomas Anderson, M.D., H.E.I.C.S.

The author gave an account of the peculiar character of the country inhabited by the Cinchona tree, and showed that similar districts existed in India where this valuable tree may be successfully grown. He also showed, by the great quantity of the bark that is used, that much profit must result to the cultivators.

2. "On the presence of Diatomaceæ, Phytolitharia, and Sponge Spicules, in Soils which support Vegetation." By William Gregory, M.D., F.R.S.E., Professor of Chemistry.

Ehrenberg, in his late work, 'Mikrogeologie,' has stated that in specimens of soils from all parts of the world, he has found many microscopic organisms; he divides these into Siliceous and Calcareous, the former including *Diatomaceæ*, *Phytolitharia*, and *Polycystina*, as well as Sponge spicules, the latter minute Mollusks and other shells. The present observations are confined to the siliceous organisms, and among these, chiefly to the *Diatomaceæ*, with *Phytolitharia* and Sponge spicules, the soils examined being such as are connected with fresh water, in which the *Polycystina* do not occur.

Many of Ehrenberg's observations were made on the small portions of soil found adhering to dried plants in herbaria, and I requested Professor Balfour to supply me with such portions of soil. By his kindness I obtained upwards of sixty such specimens, almost all of which were of very small bulk, on an average not exceeding that of a pinch of snuff, and sometimes less. Of these a certain number consisted chiefly of earth, with some half-decayed vegetable matter, and many contained hardly anything but decaying vegetable matter, with a mere trace of earth. Of course, the latter are not fair specimens of soil; but I have subjected all to the same treatment, namely boiling with nitro-muriatic acid, washing, straining through gauze, and examining the fine insoluble residue. This, of course, contained all the siliceous matter present, but it also contained much organic matter, of a brown or red colour, insoluble in acids, which, if necessary, might be destroyed by ignition, when it would leave a trifling ash.

In every case I found *Diatomaceæ* in the residue, as well as *Phytolitharia*. Sponge spicules, apparently of freshwater sponges, were less frequent, but occurred in many. In a few cases, where the acid caused effervescence, there was calcareous matter present, but in most, this was not the case.

Of course, in those cases in which the proportion of earth was small, the residue consisted chiefly of the insoluble organic matter, through which, however, Diatoms and Phytolitharia were scattered, in greater or smaller proportion.

In the cases where the proportion of earth was larger, the residue was much richer in Diatoms and Phytolitharia, but almost always contained also the dark insoluble organic matter. In several, the proportion of Diatoms in the residue was so large, that it had the appearance of a regular Diatomaceous gathering, after boiling with acids. The most remarkable soils in this respect were one from the Sandwich Islands, one from Lebanon, one from the roots of a German moss, and one from Ailsa Craig.

It is to be noticed, however, that *Diatomaceæ* were found in every case, without exception, and that in all, their proportion to the whole non-calcareous earthy residue was considerable, and often large. In many of those where the proportion of earth was smallest, there was no siliceous matter in the residue, except *Diatomaceæ* and *Phytolitharia*.

The soils examined were from various and distant localities ; there were about twenty from the Andes, several from Brazil and other parts of South America, a few from North America, a few from the West Indies, one from the Sandwich Islands, one from New Zealand, a few from India, one from Lebanon, a good many from Germany, some from France, a few from Spain, and some from Britain.

The great majority of the species of Diatoms in all these were found to coincide with our British forms, but a good many species occurred in the exotic soils which have not yet been found in Britain, and most of these not even in Europe, but which have been figured by Bailey, Ehrenberg, Kützing, Rabenhorst, &c.

A good many were observed, which, so far as I know at present, have not yet been figured or described. Lastly, a certain number of species, lately found by Smith, Greville, and others, as well as by myself in Britain, and some of which are scarce, have occurred in these exotic soils. Among these I may name here, *Navicula scutelloides*, W. Sm. (Lebanon), *Orthosira spinosa*, W. Sm., Grev. (Andes, Germany), *Cymbella turgida*, W. G. (Sandwich Islands), and *Navicula varians*, W. G. (various soils).

Of such species as are unknown to Europe, I shall only mention here *Terpsinoë musica*, one of the most striking of known forms, which I found in the first soil I examined, which was from Brazil. It is accompanied by *Nitzschia scalaris*, a fine form, which occurs in Britain, but is far from frequent here.

I am satisfied that a close examination of such specimens of soil, which are often thrown away in putting up specimens in herbaria, will bring to light many new forms, and supply us with many exotic

and rare species. It is very desirable that collectors of plants should preserve a little of the earth adhering to their roots, and in this way copious materials would be obtained.

The above observations entirely confirm Ehrenberg's statements as to the distribution of the *Diatomaceæ*. They furnish evidence of the fact that these organisms are far less affected by climate and temperature than larger plants or animals; since many of the very same species are found in every latitude and in every country. For example, such common forms as *Achnanthidium lanceolatum, Achnanthes exilis, Gomphonema tenellum, G. constrictum, G. capitatum, Cocconeis Placentula, C. Pediculus, Cocconema lanceolatum, C. cymbiforme, Synedra radians, Navicula elliptica, N. rhomboides, Pinnularia viridis, P. major, P. oblonga, P. borealis, Surirella biseriata, S. ovata, Meridion circulare, M. constrictum, Cymbella maculata, C. scotica, C. cuspidata, Epithemia turgida, Ep. Argus, Himantidium Arcus, H. gracile, H. majus, Odontidium mesodon, Diatoma tenue, D. vulgare, Nitzschia linearis, N. amphioxys, Melosira varians,* and many others actually occur in every part of the world from whence these soils have come; and there is absolutely no difference between the exotic and the British forms.

Ehrenberg specifies two species, namely *Pinnularia borealis* (*P. latestriata*, W. G.) and *Eunotia amphioxys* (*Nitzschia amphioxys*, W. Sm.), as having been found by him in almost every instance. My results confirm this. In no one case have both of these been absent, and in at least nine-tenths of these soils both are present. They are often the predominant forms, and in a few cases almost the only forms present. *Gomphonema tenellum* and *Achnanthidium lanceolatum* are found in a large majority of these soils.

I am disposed to agree in opinion with Ehrenberg, that the microscopic organisms found in soils contribute materially to the increase of the soil. This is true both of the siliceous and calcareous forms. The *Diatomaceæ* live in moist earth. They obtain silica from the water, and at their death their shells are added to the soil. Where many are present, this process of transference of silica from the rock to the soil goes on very rapidly. We have so far evidence that they live in these soils, that we find them there very often in the state of self-division, which is not observed in old accumulations of the dead shells.

The peculiar capacity of the *Diatomaceæ* for resisting climatic changes, whereby the same species can live and thrive as well in the Arctic circle as under the line, corresponds well with the results of the study of the same organisms in the fossil state. In Ehrenberg's 'Mikrogeologie' will be found very fine figures of the Diatoms occurring in the different forms of Bergmehl, Tripoli or polishing slate, Kieselguhr, pumice, and other volcanic rocks, mountain limestone, amber, &c., and it will be seen that by far the greater number of the species are quite identical with recent ones. Microscopic organisms have been found so low down as the green sand of the Silurian system; but they rather belong to the *Polythalamia*. The earliest Diatoms, geologically speaking, as figured by Ehrenberg, agree in

every point, as far as the great majority of the species is concerned, with those now living in our waters, and forming deposits which will become rock at some future time.

It was supposed that most of the species in the much more recent Bergmehl were no longer to be found living; but most of them have been since found. I myself have lately found two species of the Lapland Bergmehl to be still in existence, namely *Eunotia octodon* and *Synedra hemicyclus*; and *Eunotia incisa*, which occurs both in the Lapland and the Mull earths, has been found recent by me in a dozen British gatherings. Yet all these forms were supposed, not long since, to be exclusively fossil. We cannot say that there are no species exclusively fossil, but so many that have been thought so are daily found living, that it is probable the rest may be so found too, and at all events, a very large proportion of the forms in the oldest fossil deposits are absolutely identical with the forms of the present day.

I have only further to mention, that although so many species are universal in their habitat, some appear to be local. Thus, *Terpsinoë musica* does not occur in Europe, nor has it yet been found except in America, and, I think, in Australia.

Some species are decidedly Alpine; for example, *Orthosira spinosa*, which Professor Smith found on the Mont d'Or in Auvergne, and Professor Balfour on the Grampians. It occurs also in nearly every soil from the Andes.

3. "On the Effects of the Severe Frost of last winter on Plants in the neighbourhood of Sligo." By the Right Hon. John Wynne, of Haslewood.

ZOOLOGICAL SOCIETY.

April 11, 1854.—Dr. Gray, Vice-President, in the Chair.

Descriptions of two New Species of Pucrasia. By John Gould, F.R.S. etc.

Mr. Gould having recently found in the rich stores of the East India Company, at their house in Leadenhall Street, a new species of Pheasant, of the same form but remarkably different from the Pucras Pheasant, took the earliest opportunity, with Dr. Horsfield's permission, of bringing it under the notice of the Society. This fine bird, of which two specimens have been sent to the East India Company from Kafiristan by Dr. William Griffith, may be at once recognized by the uniform chestnut colouring of its mantle, breast and flanks, which has suggested the specific name of

Pucrasia castanea.

Forehead, cheeks, chin and lengthened portion of the crest dark shining green; hinder part of the head and the shorter portion of the crest dull sandy-buff, the two colours blending on the occiput; on each side of the neck an oval patch of white; lanceolate feathers of the neck, both above and below, breast and flanks, deep chestnut;